

Where:

q = CHTR, in Btu/day/lb., of water capacity;
N = NER, determined by NER test, in lbs./day;

Δh = latent heat of vaporization of the test cryogenic liquid at the NER test pressure of approximately one atmosphere, absolute, in Btu/lb.;

90 = ambient temperature at 90 °F.;

V = gross water volume at 60 °F. of the inner tank, in gallons;

t_l = equilibrium temperature of intended lading at maximum shipping pressure, in °F.;

8.32828 = constant for converting gallons of water at 60 °F. to lbs. of water at 60 °F., in lbs./gallon;

t_s = average temperature of outer jacket, determined by averaging jacket temperatures at various locations on the jacket at regular intervals during the NER test, in °F.;

t_r = equilibrium temperature of the test cryogenic liquid at the NER test pressure of approximately, one atmosphere, absolute, in °F.

(b) DOT-113A60W tank cars must—

(1) Be filled with hydrogen, cryogenic liquid to the maximum permitted fill density specified in §173.319(d)(2) table of this subchapter prior to performing the NER test; and

(2) Have a CHTR equal to or less than the SHTR specified in §179.401-1 table for a DOT-113A60W tank car.

(c) DOT-113C120W tank cars must—

(1) Be filled with ethylene, cryogenic liquid to the maximum permitted fill density specified in §173.319(d)(2) table of this subchapter prior to performing the NER test, or be filled with nitrogen, cryogenic liquid to 90 percent of the volumetric capacity of the inner tank prior to performing the NER test; and

(2) Have a CHTR equal to or less than 75 percent of the SHTR specified in §179.401-1 table for a DOT-113C120W tank car.

(d) Insulating materials must be approved.

(e) If the insulation consists of a powder having a tendency to settle, the entire top of the cylindrical portion of the inner tank must be insulated with a layer of glass fiber insulation at least one-inch nominal thickness, or equivalent, suitably held in position and covering an area extending 25 degrees to each side of the top center line of the inner tank.

(f) The outer jacket must be provided with fittings to permit effective evacuation of the annular space between the outer jacket and the inner tank.

(g) A device to measure the absolute pressure in the annular space must be provided. The device must be portable with an easily accessible connection or permanently positioned where it is readily visible to the operator.

[Amdt. 179-32, 48 FR 27708, June 16, 1983, as amended at 49 FR 24318, June 12, 1984; 66 FR 45186, Aug. 28, 2001]

§ 179.400-5 Materials.

(a) Stainless steel of ASTM A 240/A 240M (IBR, see §171.7 of this subchapter), Type 304 or 304L must be used for the inner tank and its appurtenances, as specified in AAR Specifications for Tank Cars, appendix M (IBR, see §171.7 of this subchapter), and must be—

(1) In the annealed condition prior to fabrication, forming and fusion welding;

(2) Suitable for use at the temperature of the lading; and

(3) Compatible with the lading.

(b) Any steel casting, steel forging, steel structural shape or carbon steel plate used to fabricate the outer jacket or heads must be as specified in AAR Specifications for Tank Cars, appendix M.

(c) *Impact tests* must be—

(1) Conducted in accordance with AAR Specifications for Tank Cars, appendix W, W9.01;

(2) Performed on longitudinal specimens of the material;

(3) Conducted at the tank design service temperature or colder; and

(4) Performed on test plate welds and materials used for inner tanks and appurtenances and which will be subjected to cryogenic temperatures.

(d) Impact test values must be equal to or greater than those specified in AAR Specifications for Tank Cars, appendix W. The report of impact tests must include the test values and lateral expansion data.

[Amdt. 179-32, 48 FR 27708, June 16, 1983, as amended at 67 FR 51660, Aug. 8, 2002; 68 FR 75763, Dec. 31, 2003]